

CLAIMS

What is Claimed is:

5 1) A method for supplying power to a microcontroller, the method comprising the steps of:
 a) generating an initial operating voltage of a power supply by using a passive precharge circuit for a power supply pump circuit;
10 b) boosting the initial operating voltage to a minimum operating voltage using a voltage sensor included in the power supply pump circuit, wherein the voltage sensor begins the boosting upon receiving the initial operating voltage;
 c) providing the minimum operating voltage of the power supply to a microcontroller;
15 d) receiving commands from the microcontroller to the voltage sensor to control the voltage sensor to maintain the minimum operating voltage or to increase to a higher operating voltage.

20 2) The method of Claim 1 further comprising the steps of:

 boosting the initial operating voltage to the minimum operating voltage using a gate drive boost circuit
25 controlling a transistor coupled to a drive enable circuit; and controlling the drive enable circuit using the voltage sensor circuit.

 3) The method of Claim 2 further comprising the step of:

30 controlling the voltage level of the power supply by the gate drive boost circuit controlling a duty cycle of the transistor.

4) The method of Claim 1 further comprising the steps of:

boosting the voltage level of the power supply to a normal operating voltage in accordance with the commands from the microcontroller provided to voltage sensor; and

reducing the voltage level of the power supply to the minimum operating voltage in accordance with commands from the microcontroller provided to the voltage sensor.

5) A method of Claim 1 wherein step a) further includes the step of generating the initial voltage by establishing a shunt between a battery cell to a capacitor coupled to the power supply.

6) The method of Claim 5 further comprising the step of deestablishing the shunt of the battery cell to the capacitor as boosting of the initial operating voltage by the voltage sensor begins.

7) The method of Claim 1 wherein the initial operating voltage is 1 Volt.

8) The method of Claim 1 further comprising the step of generating a clock signal for the voltage sensor using a ring oscillator circuit once the ring oscillator circuit receives the initial operating voltage.

5 9) The method of Claim 1 wherein the power supply pump circuit and the microcontroller are integrated into a single integrated circuit.

10 10) A method for supplying power to a microcontroller, the method comprising the steps of:
a) integrating a power supply pump circuit and the microcontroller into a single integrated circuit;
b) allowing the power supply pump circuit to dynamically interact with the microcontroller;
15 c) receiving by the power supply pump circuit a power supply requirement of the microcontroller and efficiently providing the power supply in accordance with the voltage requirement; and
d) optimizing power consumption of the
20 microcontroller by providing the power supply to the microcontroller when the microcontroller is in an operation mode.

25 11) The method of Claim 10 wherein integrating the power supply pump circuit and the microcontroller into a single integrated circuit eliminates a need to drive a separate input pin and a separate output pin, resulting in an increased efficiency of a communication between the power supply pump circuit and the microcontroller.

12) The method of Claim 10 wherein the microcontroller dynamically interacts with the power supply pump circuit and configures the power supply pump circuit with the power requirement, the power supply pump circuit provides power to the microcontroller in accordance with the power requirements.

13) The method of Claim 10 wherein integrating the power supply pump circuit and the microcontroller results in using a single integrated circuit, reducing footprint on a printed circuit board.

14) The method of Claim 10 wherein integrating the power supply pump circuit and the microcontroller into a single integrated circuit reduces pin connection requirements to one pin.

15) The method of Claim 10 wherein integrating the power supply pump circuit and the microcontroller into a single integrated circuit eliminates the requirements of a separate monitoring device for an independent power supply pump circuit.

16) A method for supplying power to a microcontroller, the method comprising the steps of:

a) generating an initial operating voltage by connecting a passive precharge circuit to a battery circuit;

b) initializing operation of a drive enable circuit, a voltage sensor circuit, a ring oscillator circuit, and a gate drive boost circuit at the initial operating voltage;

c) boosting the initial operating voltage to a minimum operating voltage of the microcontroller; and

d) monitoring the microcontroller's minimum operating voltage using the voltage sensor circuit and increasing the minimum operating voltage to a voltage level demanded by the microcontroller.

17) The method of Claim 16 wherein the battery circuit includes a single dry cell, an inductor, a diode and a capacitor.

18) The method of Claim 16 wherein the battery circuit requires only one dry cell battery.

19) The method of Claim 16 wherein the battery circuit includes a single dry cell, an inductor, and a capacitor.

5 20) The method of Claim 16 wherein the battery circuit may supply power to other devices on a printed circuit board.

10 21) The method of Claim 16 wherein the battery circuit is an off chip circuit.

15 22) The method of Claim 16 wherein the passive precharge circuit allows the power supply pump circuit to operate before the voltage sensor and the drive enable circuit begin their normal operation.